TOPOLOGICAL SORTING

GROUP MEMBERS

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PREFACE

Problem Description

Student Activities

Topological sort

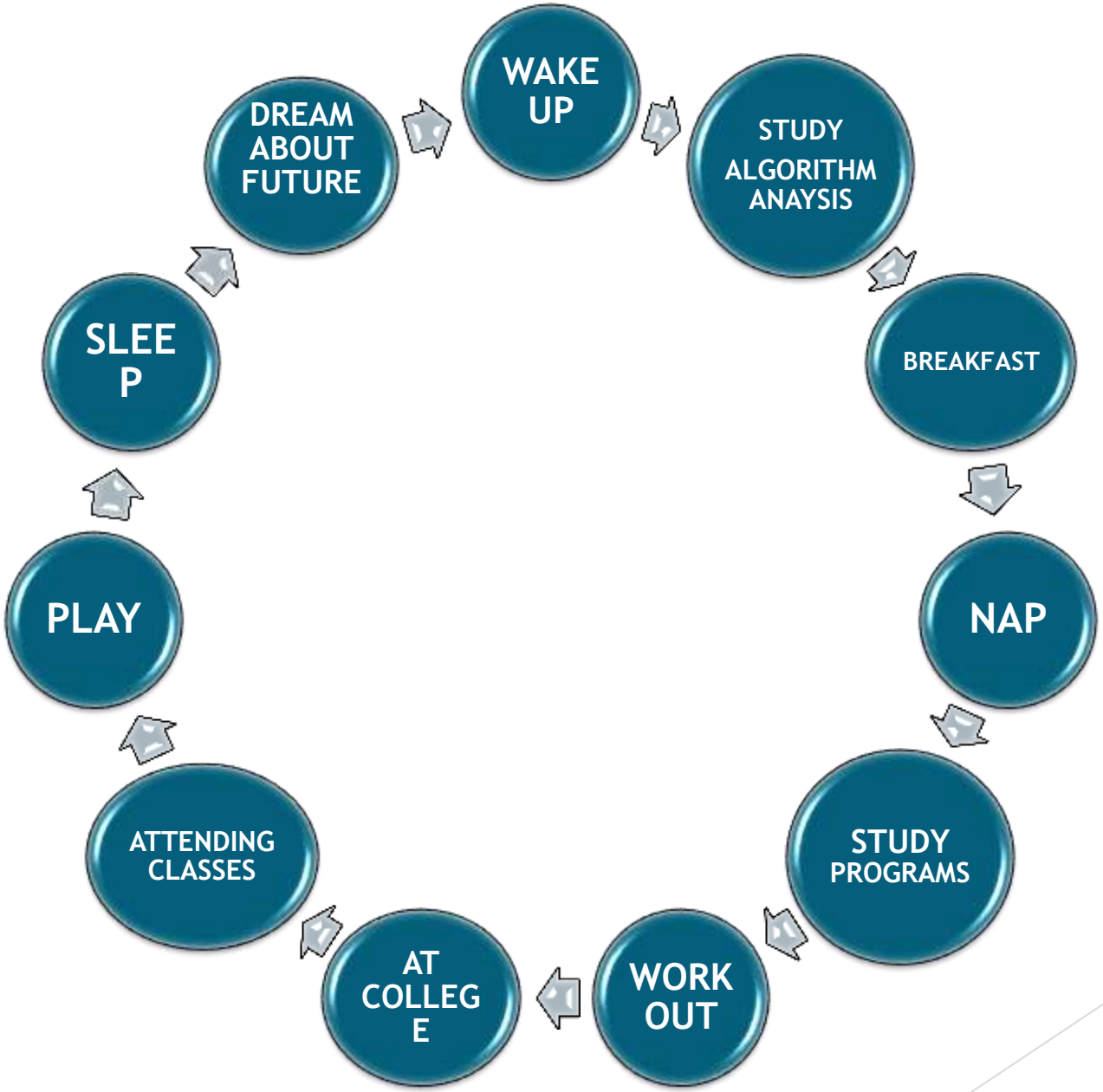
Algorithm of topology sorting

Complexity Of an algorithm

PROBLEM DESCRIPTION

A Student has various activities to be performed on time to maintain effectiveness in both educational and professional development. So in order to keep the activities organized in a effective manner, the order of the activities to be done is sorted systematically using the topological sorting algorithms.

ACTIVITIES OF STUDENT



Student activity graph

TOPOLOGICAL SORT

DEFINITION :

A Topology sort or topological ordering of a directed graph is a linear ordering of its vertices such that for every directed edge UV from vertex U to vertex V,Ucomes before V in the ordering

ALGORITHM

1. Compute the indegrees of all vertices

2. Find a vertex U with indegree 0 and print it (store it in the ordering)If there is no such vertex then there is a cycle and the vertices cannot be ordered. Stop.

3. Remove U and all its edges (U,V) from the graph.

4. Update the indegrees of the remaining vertices.

5. Repeat steps 2 through 4 while there are vertices to be processed

IMPROVED ALGORITHM

After the initial scanning to find a vertex of degree 0, we need to scan only those vertices whose updated indegrees have become equal to zero.

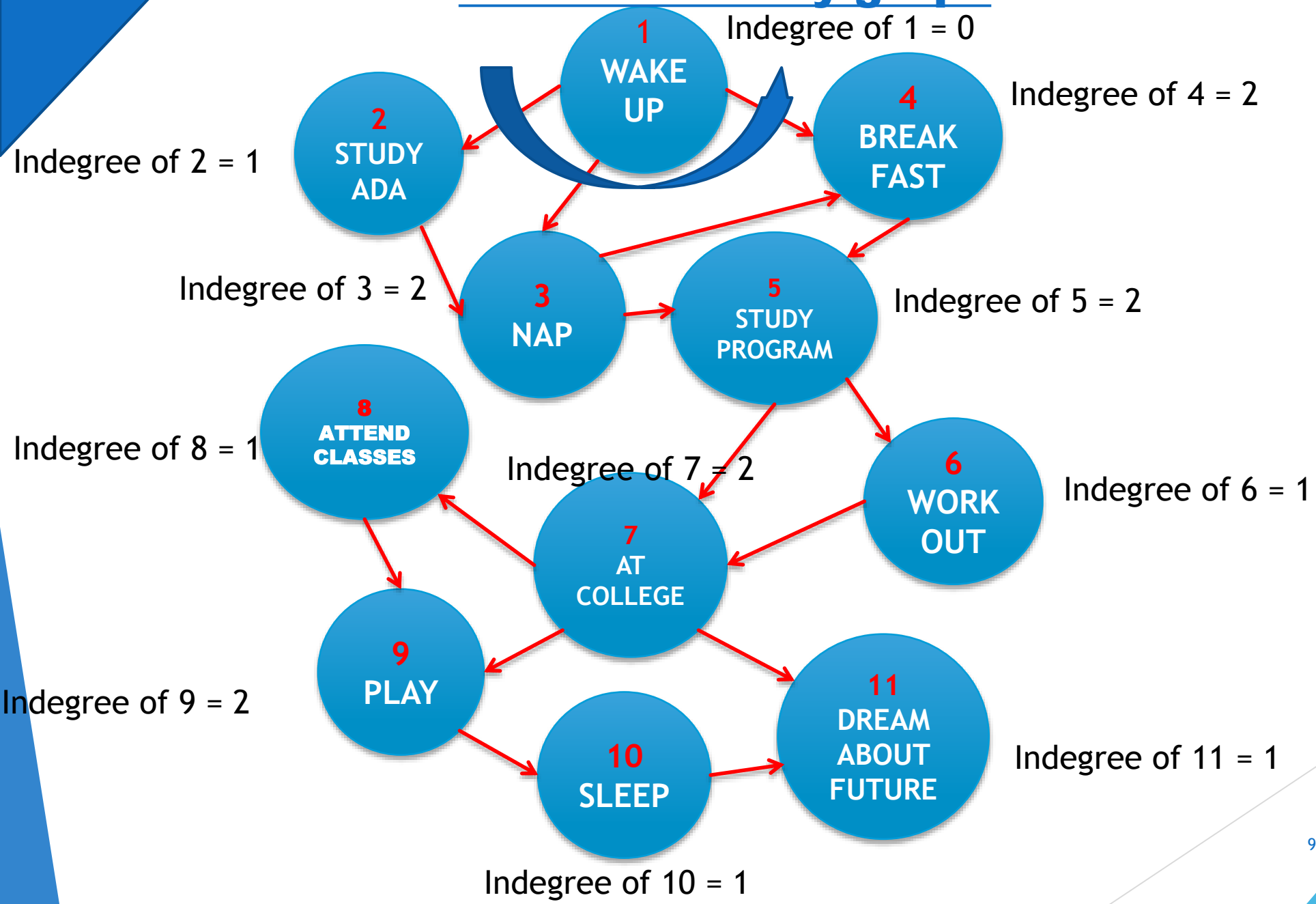
1. Store all vertices with indegree 0 in a queue

2. Get a vertex U and place it in the sorted sequence (array or another queue).

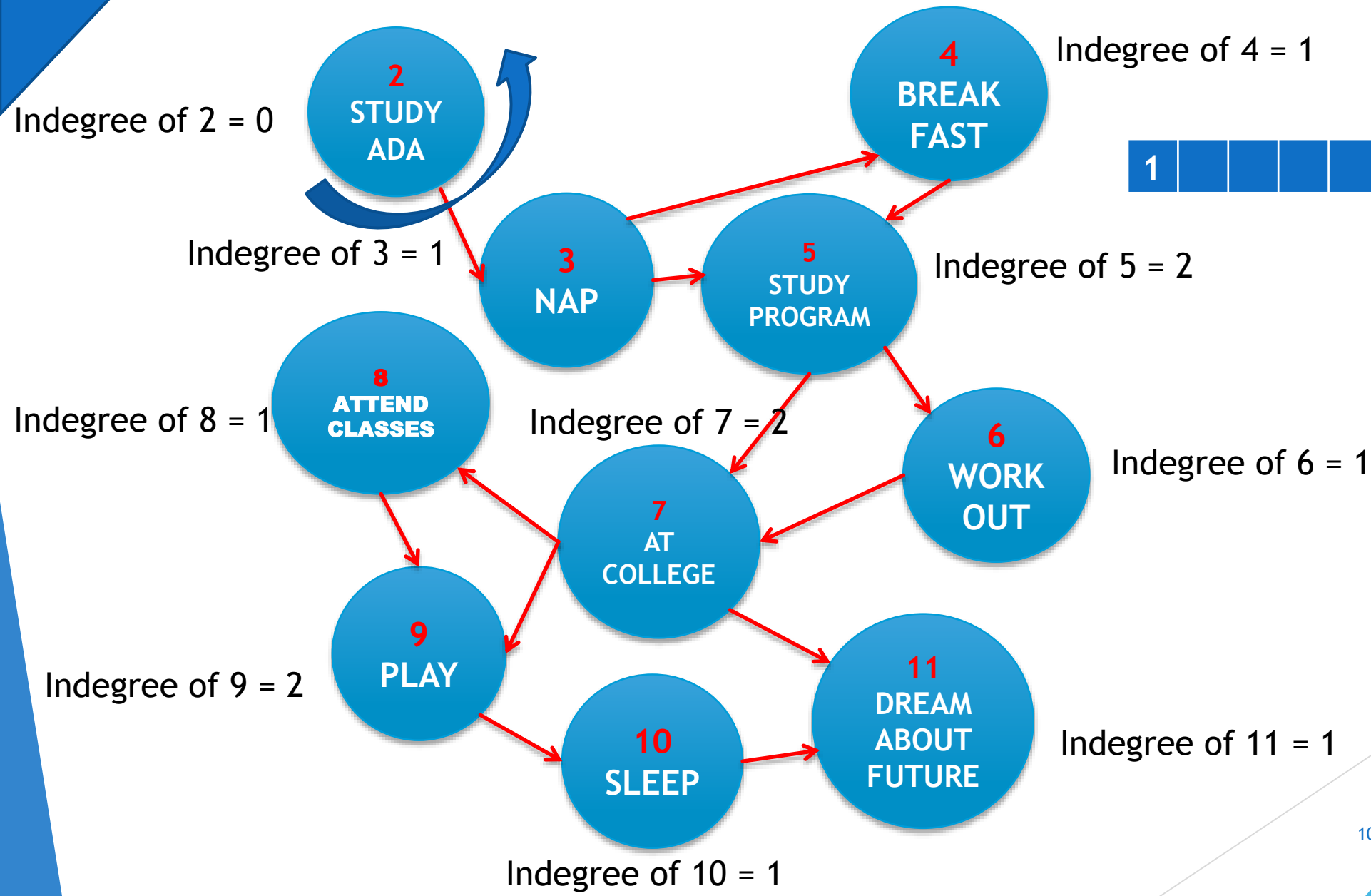
3. For all edges (U,V) update the indegree of V, and put V in the queue if the updated indegree is 0.

4. Perform steps 2 and 3 while the queue is not empty.

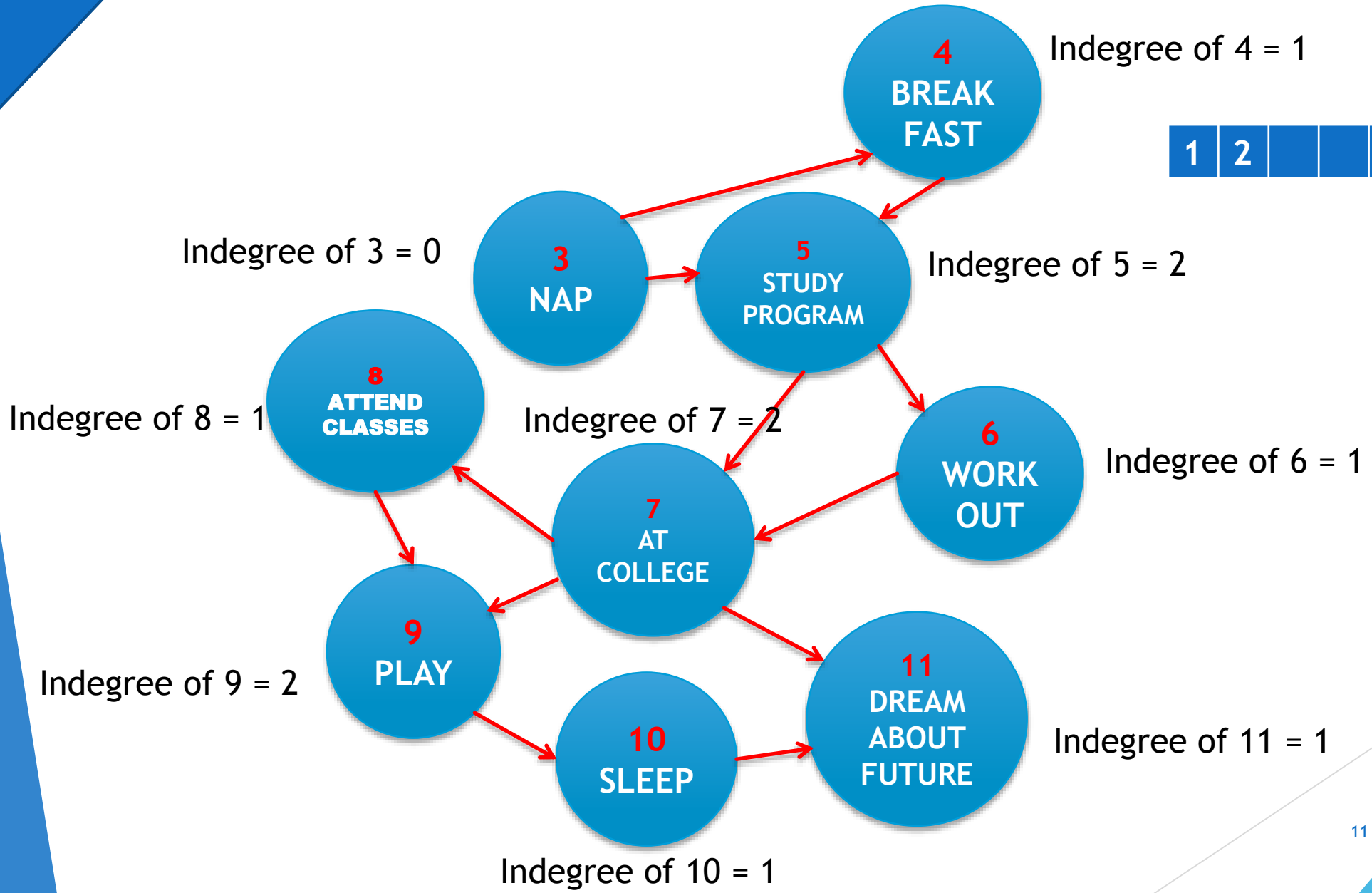
Student activity graph



Student activity graph



Student activity graph



SORTED ACTIVITIES

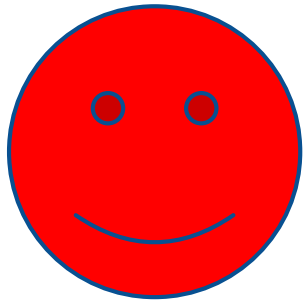
1 WAKE UP	2 STUDY ADA	3 NAP	4 BREAK FAST	5 STUDY PROGRAM	6 WORK OUT	7 AT COLLEGE	8 ATTENDING CLASS	9 PLAY	10 SLEEP	11 DREAM ABOUT FUTURE

COMPLEXITY OF AN ALGORITHM

For input graph G = (*V,E), Run Time = ?*

Break down into total time required to:

- **Initialize In-Degree array: O(|*E|)***
- **Find vertex with in-degree 0:|*V| vertices, each takes O(|V|) to search In-Degree array.***
- **Total time = O(|*V|²)***
- **Reduce In-Degree of all vertices adjacent to a vertex: O(|*E|)***
- **Output and mark vertex: O(|*V|)***
- **Total time= O(|V|² + |E|) Quadratic time!**



THANK YOU